



INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 11-06 Technical Advisory

March 8, 2011

TO: All Design, Operations, and District Personnel, and Consultants

FROM: /s/ Merrill E. Dougherty
Merril E. Dougherty
Manager, Office of Hydraulics
Bridge Design, Inspection, Hydraulics, and Technical Support Division

SUBJECT: Bridge-Scour-Analysis Q_{500} Discharge Determination

REVISES: *Indiana Design Manual* Section 32-6.07

EFFECTIVE: Stage 1 Submittal After Date of This Memorandum

The use of 1.7 times the Q_{100} discharge to estimate the Q_{500} discharge for scour analysis is no longer permitted. There are enough methods for estimating Q_{500} that the 1.7 multiplier is no longer needed. This method was recommended in HEC-18 when no other method was available. This method is extremely conservative for most streams, resulting in additional cost for the bridge foundations. Recommended methods for estimating Q_{500} are described below.

IDNR. If the bridge will require a Construction in a Floodway Permit, a Q_{500} estimate should be also be requested when requesting the Q_{100} estimate from IDNR.

Frequency Analysis of Stream-Gaging Records. This method is considered to have high confidence on larger watersheds when data is available, since it involves real-time data. The USGS and the IDNR Division of Water both maintain a database of discharges for various frequencies computed using the methodologies included in Water Resources Council Bulletin 17B. The gage need not be located at the site. It can be on an adjacent stream with similar characteristics. Q_{100} and Q_{500} should be determined at the gage site, using that ratio to multiply Q_{100} at the bridge site to get Q_{500} .

NRCS Curve-Number Method. For a smaller watershed where the NRCS curve-number method is used in a computer program, an additional run can be made using the rainfall data for the 500-year frequency event. The data for the 500-year event is in NOAA Atlas 14. The NOAA Atlas 14 data appears on the NOAA website at http://hdsc.nws.noaa.gov/hdsc/pfds/orb/in_pfds.html.

alu:med

[P:\Structural Services\Design Memos\Signed\2011\1106-ta.doc]